

## "Newton's Laws Recap" Review:

1st Law:

4. No. inertia  $\rightarrow$  mass

10. C, D, A, B

.

## Weight and Mass

- Weight  $\rightarrow$  measure of force due to the acceleration of gravity
  - Weight is a vector (mass is scalar)
  - Direction is typically down
  - Dependent on acceleration due to gravity
    - Earth =  $9.8 \text{ m/s}^2$
    - Moon =  $1.6 \text{ m/s}^2$
  - Equation for weight:

$$F_g = m a_g$$

$$F_g = m g$$

$F_g$  = force of  
acceleration due to  
gravity

$a_g = g$  = acceleration  
due to gravity

- Units: newtons (N)  
(pounds in English units)

- Mass


- the amount of stuff in an object
- the same everywhere

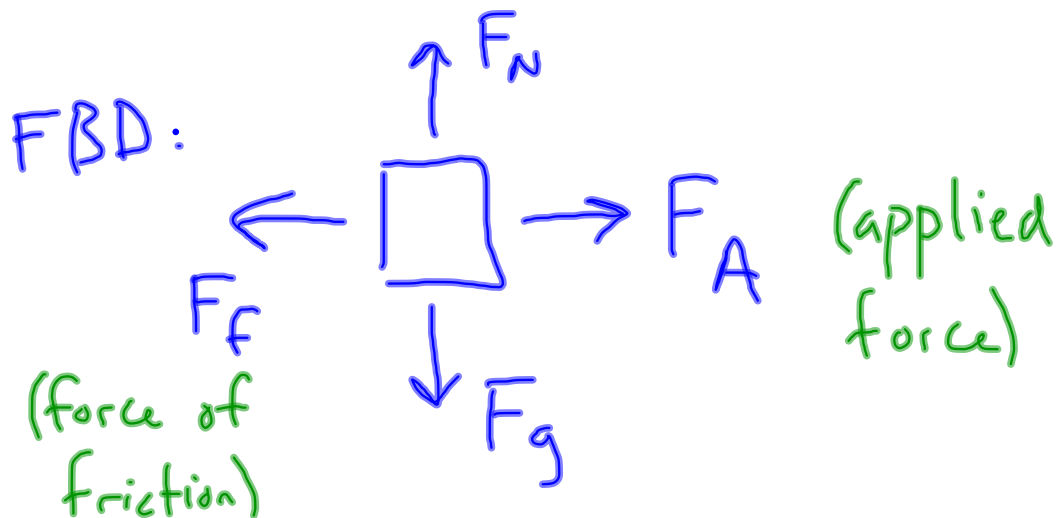
## Friction and FBDs :

- Friction

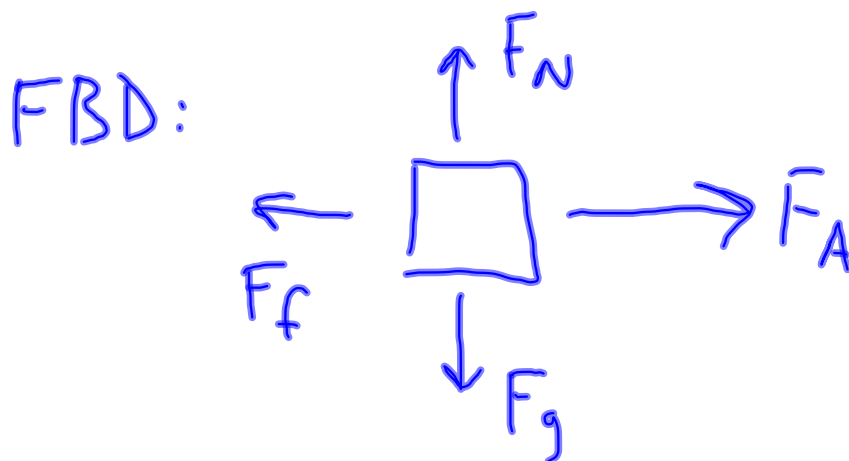
- Force that comes between contact of two surfaces
- All surfaces at an atomic level are "rough"  $\rightarrow$  friction is always present
- Friction can be minimized but never eliminated if there is physical contact
- Force of friction is always opposite the direction of motion

• FBD's with multiple forces:

1.  Box moving to the right  
with constant velocity  
 $a = 0 \text{ m/s}^2$



2.  accelerating to the right



- Equilibrium  $\rightarrow$  balanced set of forces
  - Object is:
    - At rest in one direction
    - Moving with constant velocity in one direction
- Non-equilibrium  $\rightarrow$  unbalanced forces
  - Acceleration will happen in the direction of the greater force